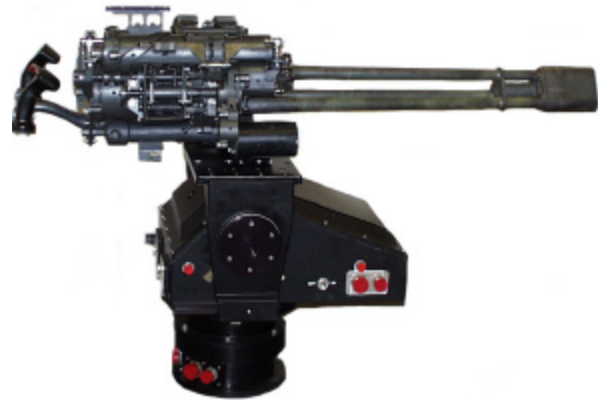


Weapon Systems Improvement



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Weapons Systems Improvements

Background/Customers

MK98 Universal Gun Mount

Remote Operated Small Arms Mount (ROSAM)

Integrated Radar/Optical Sighting System (IROSS)

Integrated Bridge System (IBS)

Future Workload

Background

MK38 Machine Gun System

Navy Operational Requirement (1982)

Special Warfare Conventional Mounts

Naval Special Warfare Command (1990's)

MK V Special Operations Craft

Weapons Installations (1995)

Weapons Enhancement Efforts

Office of Special Technology (1998)

Remote Operated System Testing

US Special Operations Command (2000)



Supported Weapons

WEAPON: GAU-17 GATLING GUN (Mini-Gun)

- CALIBER: 7.62MM
- WEIGHT: 40 LBS.
- RATE OF FIRE: 3000 RND/ MIN.
- EFFECTIVE RANGE: 1000 YARDS



WEAPON: M240 MACHINE GUN

- CALIBER: 7.62MM
- WEIGHT: 26 LBS.
- RATE OF FIRE: 750-950 RND/ MIN.
- EFFECTIVE RANGE: 1000 YARDS



WEAPON: GAU-16 MACHINE GUN

- CALIBER: .50
- WEIGHT: 61 LBS.
- RATE OF FIRE: 750-850 RND/ MIN.
- EFFECTIVE RANGE: 2000 YARDS



Supported Weapons

Continued.....

WEAPON: M2 MACHINE GUN

- CALIBER: .50
- WEIGHT: 82 LBS.
- RATE OF FIRE: 450-550 RND/ MIN.
- EFFECTIVE RANGE: 2000 YARDS



WEAPON: MK19 MACHINE GUN

- CALIBER: 40MM GRENADE
- WEIGHT: 77.6 LBS.
- RATE OF FIRE: 325-375 RND/ MIN.
- EFFECTIVE RANGE: 1600 YARDS



WEAPON: M60 MACHINE GUN

- CALIBER: 7.62MM
- WEIGHT: 23 LBS.
- RATE OF FIRE: 550 RND/ MIN.
- EFFECTIVE RANGE: 1000 YARDS

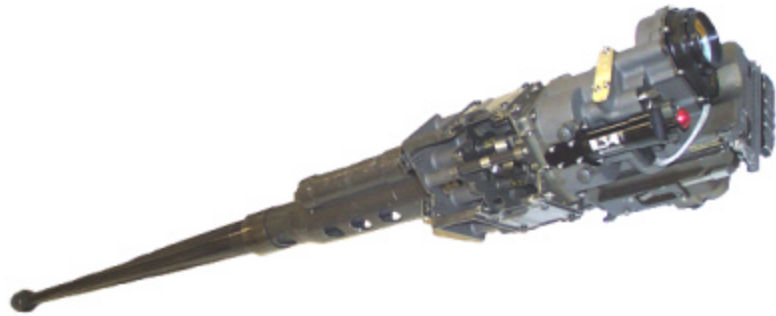


Supported Weapons

Continued.....

WEAPON: MK45 25MM AUTOMATIC GUN

- CALIBER: 25MM
- WEIGHT: 265 LBS.
- RATE OF FIRE: 400 RND/ MIN.
- EFFECTIVE RANGE: 3000 YARDS



WEAPON: MK44 30/40MM AUTOMATIC CANNON

- CALIBER: 30/40MM
- WEIGHT: 341 LBS.
- RATE OF FIRE: 200 RND/ MIN.
- EFFECTIVE RANGE: 5600 YARDS



WEAPON: M242 AUTOMATIC MACHINE GUN

- CALIBER: 25MM
- WEIGHT: 256 LBS.
- RATE OF FIRE: 175 RND/ MIN.
- EFFECTIVE RANGE: 2700 YARDS



Maritime Customers:

- Every US Navy Ship
- Every US Special Operations Command Craft
- Every US Coast Guard Cutter
- US Marine Corps (Riverine Craft)
- Joint Special Operation Command Craft
- Foreign Military Sales



MK 98 Universal Gun Mount

Background/Customers

MK98 Universal Gun Mount

Remote Operated Small Arms Mount (ROSAM)

Integrated Radar/Optical Sighting System (IROSS)

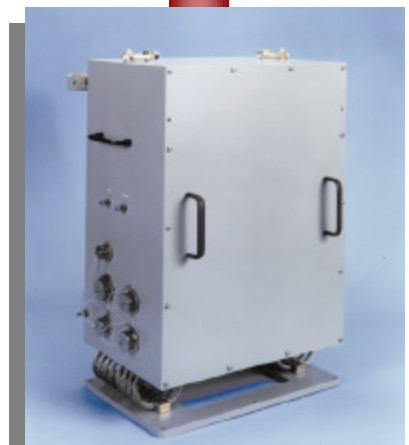
Integrated Bridge System (IBS)

Future Workload



Features

- Utilizes the MK98 MOD 0 Universal Gun Mount
- System is Modular
- Drive / Stabilization Control is Digital with Auto Track (PC Based)
- Includes Sensor and Fire Control Options
- Configuration Options



Configuration Options

■ Sensors

- Dual CCD Television Cameras (resident)
- Color CCD Television
- TWS or MFLIR (TIS)
- ESLRF
- Packaged Multi-Sensor (Remote Operated Small Arms Mount Integrated Bridge System – US SOCOM)

■ Fire Control

- Ballistic Look Up Tables (resident)
- AN/SPS-73 Radar
- Interfaces with MK86, MK160, or Flexible Fire Control System
- Direct Interfaces to MK46 MOD 1

■ Weapons

- | | |
|---------------|-----------------------------|
| – 25mm | M242 or MK45 |
| – .50 Caliber | Gatling (GAU-19) or twin M2 |
| – Missiles | Stinger |
| – (30mm | MK44 (with redesign)) |

■ Other

- Low RCS

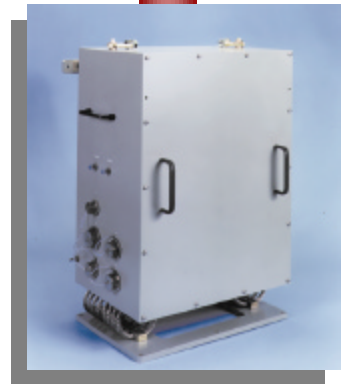
Basic System

■ Features

- Bushmaster High Rate of Fire 25mm Chain Gun (dual feed) (MK45 MOD 0)
- 2-Axis Stabilization (gyro)
- Total Remote Control with manual range inputs for ballistics offset calculation
- Automatic Video Tracker
- PC Based Digital Design (gun processor)
- Boresight Adjust Provisions
- Interfaces with existing MK38 deck mount
- Utilizes ships power

■ Specifications

- Electronic Drive
 - 0.03° to 30° / sec Velocity
 - 60° / sec² Acceleration
- Stabilization
 - 400 microradians RMS
- Television / Dual FOV
 - Monochrome CCD (daylight)
- Power
 - 115 VAC / 60 Hz / 30 Amps (or 24 VDC)
- Weight
 - Weapon Mount 762 kg (1680 lbs)
 - Electronics Unit 136 kg (300 lbs)



Mount

- **Control** Local (Manual) or Remote
- **Train** $\pm 150^\circ$ Azimuth
(with adjustable limit stops to $\pm 180^\circ$)
 $+55^\circ$ Elevation
 -20° Depression
- **Height** 137.2 cm (54 inches)
- **Working Circle** 460.0 cm (181 inches)
- **Deck Mount** 73.7 cm (29 inches)
- **Security** Azimuth and Elevation
Manual Stow Locks
- **Ready Ammo (25mm)** 600 rounds / dual container
- **Ammo Reload Time** 4 minutes

R.O.S.A.M.

Remote Operated Small Arms Mount

Background/Customers

MK98 Universal Gun Mount

Remote Operated Small Arms Mount (ROSAM)

Integrated Radar/Optical Sighting System (IROSS)

Integrated Bridge System (IBS)

Future Workload



Features

- **Surface Scanning Radar**
- **Remote Optical Sighting System**
- **Interface Module**
- **Hand Controller**
- **GPS, Digital Navigation Compass**
- **Autonomous Mount/Weapons**

Protocols

- **NMEA 0183 RSD format**
 - (\$--RSD,x.x,x.x,x.x,x.....x.x,a,a*<CR><LF>)
 - TLL similar
 - ARP processed data
- **Mount Protocol Data**
 - RS485 data
 - \$ 1V0010) **velocity command elevation**
 - \$ 2V0005) **velocity command azimuth**
- **Remote Optical Sighting Systems**
- **GPS, Digital Compass**
- **DNC NIMA Charts**
- **LAN TCP/IP protocol**
- **RS232 protocol commands**
- **Wireless communication devices**

Optical Sighting Systems

- ARGOS Vision Systems
- FLIR Systems
- Wescam
- Boeing
- Kollmorgen

POP-200
MARFLIR
Model 14
TISS
MK 46 OSS



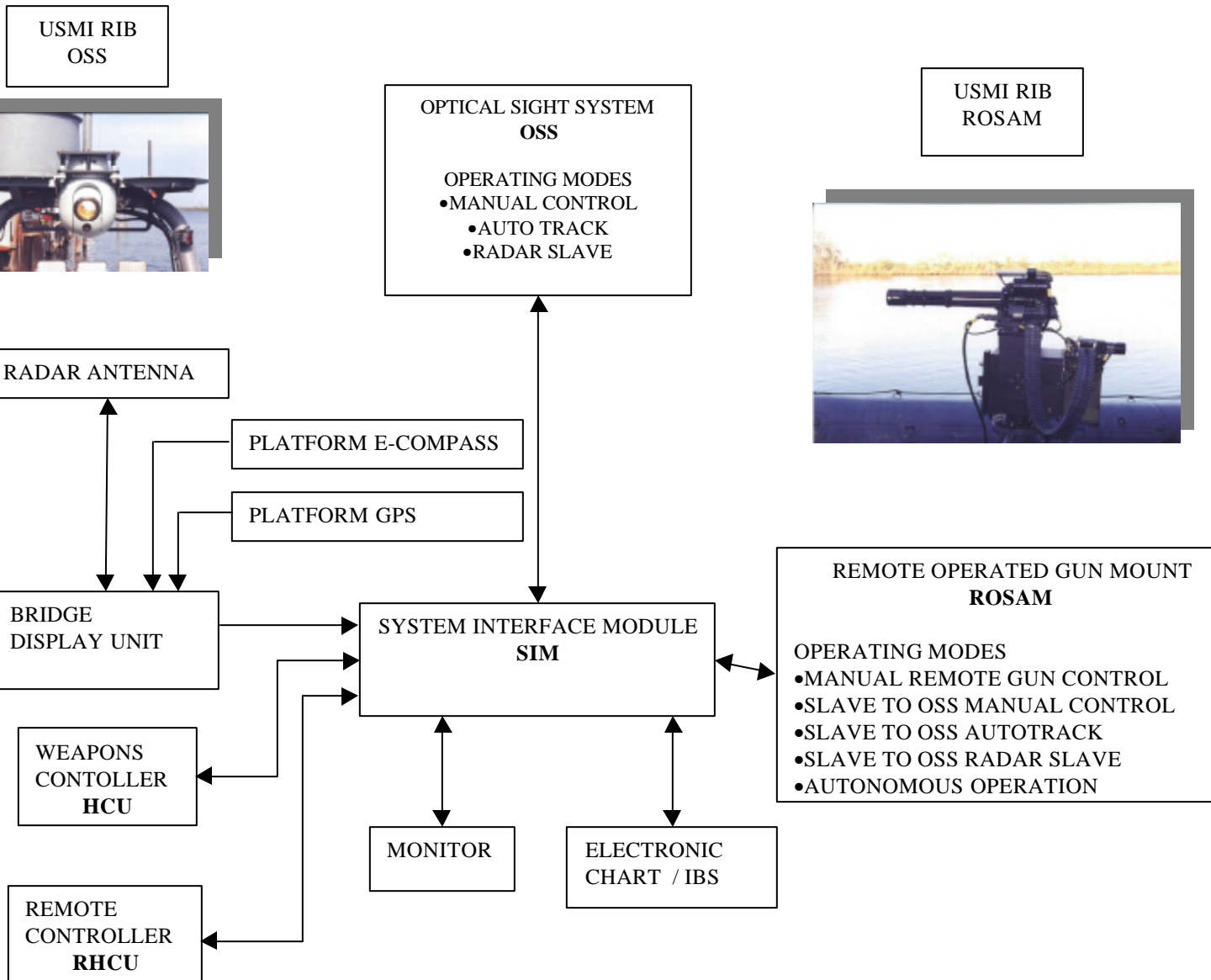
Mount

- 60° Per Second Slew Rate
- 160 Pounds
- 600 lbs. Maximum Carrying Capacity
- 2-Axis Stabilization
- 24V \pm 2 VDC, 25 AMP Fused
- RS485 Control Output Compatible
- 1 Milliradian Precision
- 60 Degree Tilt Range
- 360 Degree Azimuth Range
- Contrast/Edge Auto-Tracker
- On Mount FLIR/Camera
- Weapons: Twin M2HB, Single M2HB, MK19, MK44 7.62 Gatling Gun, Missiles



Mode of Operation

- **Radar Identifies the Targets (NMEA 0183 Output)**
- **OSS (Optical Sighting System) Slaves to the Radar Bearing (*If no OSS is used, the mounts sight is substituted*)**
- **OSS Tracks the Target**
- **Mount Slaves to the Sight**
- **(Optional) Slave to GPS Location**
- **(Optional) Slave to Remote Radar Scan**



Integrated Radar/Optical Sighting System (IROSS)

Background/Customers

MK98 Universal Gun Mount

Remote Operated Small Arms Mount (ROSAM)

Integrated Radar/Optical Sighting System (IROSS)

Integrated Bridge System (IBS)

Future Workload

Features

- **ROSAM Hardware**
- **Charting Overlays**
- **Picture-in-Picture Multi Viewing**
- **Multi Weapons Mount Integration**
- **One Workstation**

**Surface Scan
Radar**



Remote sensor



**Integrated
Common Operational Picture**



Electro Optical Sensor



Remote Monitor



Controller



Weapon Mount



SIM



Integrated Bridge System

Background/Customers

MK98 Universal Gun Mount

Remote Operated Small Arms Mount (ROSAM)

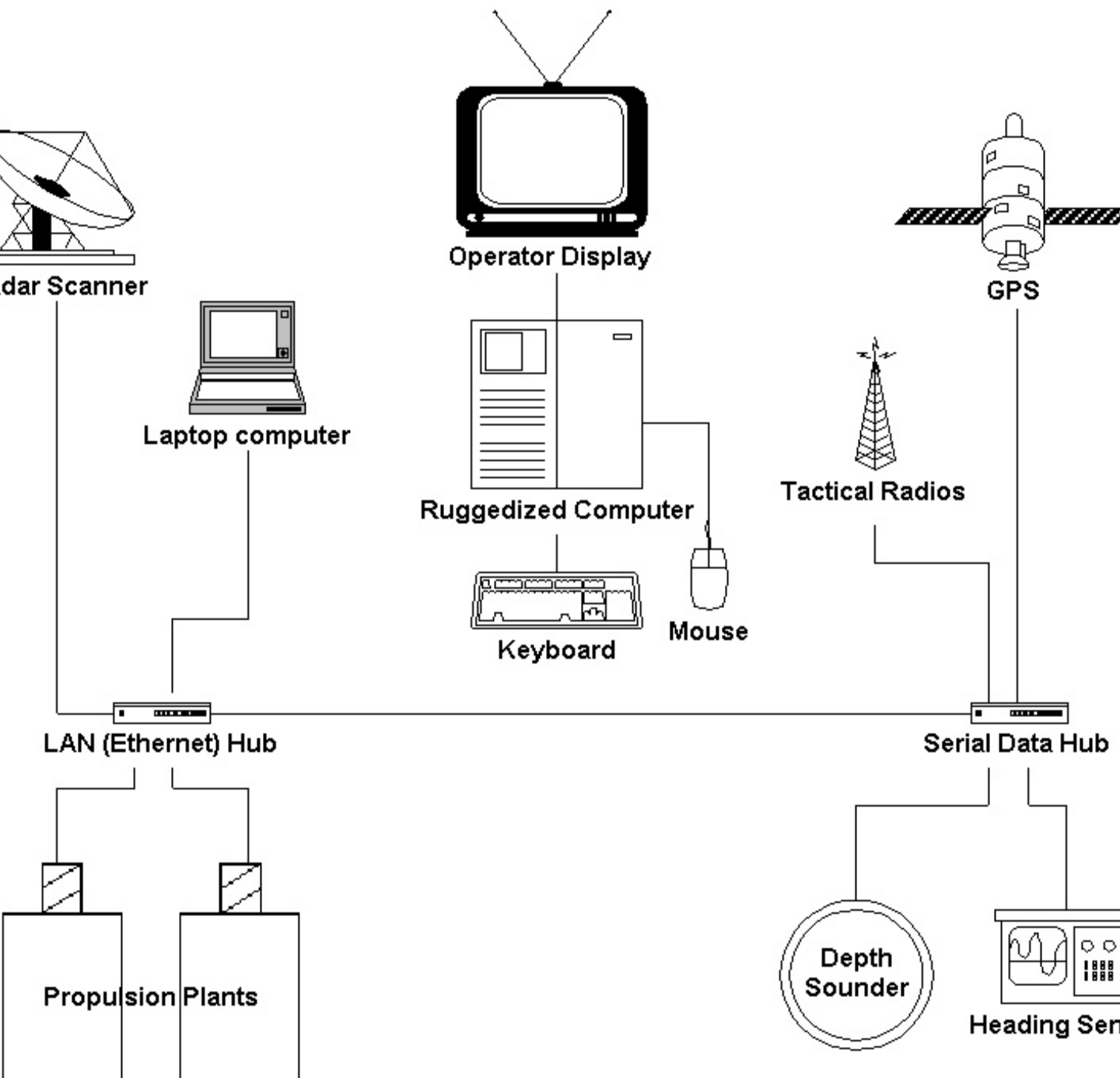
Integrated Radar/Optical Sighting System (IROSS)

Integrated Bridge System (IBS)

Future Workload

Features

- **US SOCOM Operational Requirement**
- **Integration of Command and Control Functions**
 - **Radios, GPS, Video Consolidation**
 - **Navigation Charts**
 - **Engine Monitors**
 - **Weapons Control**
 - **Multiple Interchangeable Workstations**
- **Small Craft Compatible**
- **Daylight Screens**



Integrated Bridge System

Future Workload

Background/Customers

MK98 Universal Gun Mount

Remote Operated Small Arms Mount (ROSAM)

Integrated Radar/Optical Sighting System (IROSS)

Integrated Bridge System (IBS)

Future Workload

- **USSOCOM Weapons Control**
 - ◆ **Radar enhancement**
 - ◆ **Missiles**
 - ◆ **Multi Mount Control**
- **Training Platform Simulator**
- **ROSAM/IBS Block 3**
- **Remote target designation**
- **Remote Operation/Distance Support**
- **UAV/UWV Application**
- **IROSS Concept Demonstrator**

Summary

⚙ By The End of Next Fiscal Year

- **MK98 Stabilized Mount with Multiple Weapons Kits**
 - Twin M2HB's
 - Twin Stinger Missiles
 - M242 25MM Cannon
 - MK45 High Rate 25MM Cannon
 - Provisions for MK44 30MM Cannon
- **ROSAM Completion**
 - Multiple Radar
 - Multiple OSS
- **IROSS / IBS Integration**
 - MK98
 - ROSAM
 - Multiple Mounts
- **MWPS Trainer**